Homeland Security

N42.42

ANSI Standard for Data Format for Radiation Detectors Used for Homeland Security

George P. Lasche, Ph.D.
Sandia National Laboratories
Technical Chair

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Homeland Security

N42.42 Committee Membership

- George Lasche, SNL, *Co-chair and project leader*
- Leticia Pibida, NIST, *Co-chair and project leader*
- Bob Huckins, Canberra, *Secretary and editor*
- Robert Bass, PNNL
- Peter Chiaro, ORNL
- Carl Czajkowski, BNL
- Charles Finfrock, BNL
- Ronald Keyser, Ortec
- Johnny Long, Thermo
- Lew Meixler, NucSafe
- Keith Olson, LANL
- Scott Rogers, Canberra-Aquila
- Richard Smola, Ludlum
- Adrian Stoian, Exploranium/SAIC
- Dave Weirup, LLNL

Homeland Security

N42.42 Goals

Facilitate the use of radiation data with particular regard to homeland security, emergency response, and common data sharing needs

- **Readability: easily accessed and understood by analysts without the need for proprietary software.**
- **Compatibility: compatible with accepted international standards for data representation to the broadest extent possible.**
- **Extensibility: provide for unforeseen future needs and for as-yet unknown requirements particular to the specific needs of individual manufacturers of instrumentation.**
- **Impartiality: should not favor any particular commercial interest by adopting a particular manufacturer's practices.**

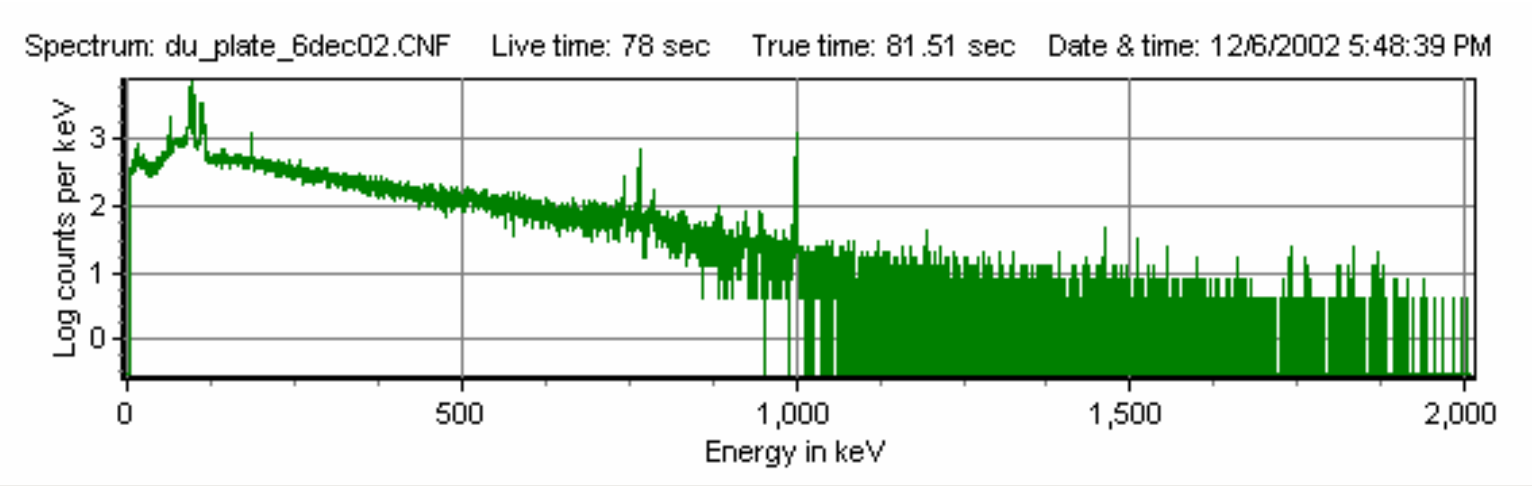
Homeland Security

N42.42 Accommodates all 5 of the Basic Homeland Security Instrument Types

- N42.32: Alarming Personal Radiation Detectors
- N42.33: Portable Radiation Detection Instrumentation
- N42.34: Radionuclide Identifier Detectors
- N42.35: Radiation Detection Portal Monitors
- N42.38: Spectroscopy-Based Portal Monitors

Homeland Security

N42.42 File Sizes are Smaller than Binary Counterparts



- Canberra CNF format: 63 kB
- Ortec CHN format: 33 kB
- N42 format: 22 kB

Homeland Security

N42.42 Example File

```
<?xml version="1.0" encoding="UTF-8"?>
<N42InstrumentData xmlns:Cambio="Cambio">
  <Measurement>
    <Spectrum Type="PHA">
      <StartTime>2004-06-17T13:29:59-07:00</StartTime>
      <LiveTime>PT268.76S</LiveTime>
      <RealTime>PT300S</RealTime>
      <Calibration Type="Energy">
        <Equation Model="Polynomial">
          <Coefficients>0.115338012576103 2.87604451179504 0.000602373736910522</Coefficients>
        </Equation>
      </Calibration>
      <ChannelData>
0 0 90 90 90 90 414 944 1287 1556 1779 1916
1991 2267 2512 2691 2832 2641 2844 3214 3735 4254 4836 5481
6966 9386 12374 13573 11316 8048 6440 5993 4949 3904 3056 2715
2627 2666 2685 2812 2743 2865 3026 3132 3240 3320 3369 3385
3398 3407 3298 3256 3133 3132 3129 3228 2927 3029 2893 2918
...
0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
      </ChannelData>
    </Spectrum>
    <Cambio:OriginalFileType>Exploranium GR-135 v2, Size: 2124</Cambio:FileType>
  </Measurement>
</N42InstrumentData>
```

Homeland Security

N42.42 Format Key Features

- Extensible to unforeseen future needs – retains backward *and forward* compatibility
- Human readable – in an emergency, no special software is needed to get the key data
- Machine readable – based on XML, a standard maintained by the World-Wide Web Consortium (W3C)
- Provides a single format for all radiation detectors – all data can be archived in one common format – XML acts also as a database, with retrieval using XPath
- Not binary -- Easily passes servers scanning for viruses
- File size economy – Generally smaller files than the binary equivalent
- Can be checked (”validated”) by machine for correct syntax

Homeland Security

N42.42 – Downloading the Draft Standard

Temporarily: Enter the following URL in your browser:

ftp://ftp.sandia.gov/pub/N42/DraftN42.42.zip

When the IEEE has finished proofreading and typesetting:

http://standards.ieee.org/getN42/index.html

Schemas and examples can be found at:

http://physics.nist.gov/Divisions/Div846/Gp4/ANSIN4242/xml.html